

HISTORY OF LUNG DISEASES OF COAL MINERS IN GREAT BRITAIN: * PART II, 1875-1920

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"The prevention of disease is fully as reliable a testimony of professional skill and scientific knowledge as its treatment; whilst it is generally considered to constitute a surer evidence of the possession of that disinterested and noble philanthropy which should ever characterise the disciples of physic." W. I. Cox (1857)

In a lecture to the Edinburgh Medical Society, delivered in 1883, and later published under the title of "Germs, Dust and Disease", Dr. Andrew Smart expressed the opinion that anthracosis or "miners' consumption" had but a doubtful, if any, existence. Thereafter, he continued his study of coal miners from different districts and communicated his results in a "Note on Anthracosis" read at the annual meeting of the British Medical Association at Cardiff in 1885. The observations which he then presented confirmed his previous conclusions, particularly the non-existence of "anthracotic disease" and that pulmonary consumption was of exceptionally rare occurrence among coal miners. He discusses his findings thus:

"Looking to their longevity, high standard of health, and low death-rate, especially from pulmonary disease, one is led to suppose that there must be some special protective feature in coal-mining operations not shared in by the rest of the dusty trades. The preserving element may, after all, be the dust derived from the coal, which has hitherto been credited with the opposite effect.

The antiseptic properties of carbon are generally admitted; and I can aver that, not infrequently, I have examined miners, who, for over fifty years, have daily respired the coal-dust laden air of the mines, with no other effects than the perfectly harmless staining of the sputa, and, it may be, in some instances, of the pulmonary tissue."

Occupational Mortality Statistics

A more general view of medical thought on the disease about this period was presented by Dr. Ogle (1885) in the supplement to the forty-fifth annual report of the Registrar-General, which

* Part I was published in 1951 (8, 127).

relates to England and Wales for the 10 years 1871-1880.

In dealing with the mortality statistics of miners, Ogle emphasized certain difficulties; first, that death certificates seldom distinguished between coal and other miners, and secondly, that frequently there existed confusion between phthisis and other affections of the respiratory organs. The former difficulty was largely surmounted by separating the deaths according to geographical areas, for as it happens, coal and metalliferous mining seldom overlap to any serious extent in the same area; thus Northumberland is mainly coal mining, N. Yorkshire, ironstone mining, and Cornwall, tin mining. Ogle submits:

"If we exclude accidents, it will be found that the mortality of the coal miners only slightly exceeds that of the most healthy class of men, the agriculturists, that is to say, the farmers, the agricultural labourers, and the gardeners."

Dr. Greenhow in 1858 had recorded that "whilst lead and copper and tin mining are certainly dangerous to health, coal mining appears to be at least not 'unhealthy'".

These statements, it was realized, might not be wholly true, due to the fact that miners are a body of picked men and that any who become weakly must, by the heavy nature of the work, abandon it for a lighter occupation.

When all due allowance was made for possible inaccuracies, Ogle concluded:

"It must be admitted that coal miners suffer from diseases of the respiratory organ to a greater extent than those engaged in most other industries."

He did, however, emphasize "the comparative

innocuity of coal dust, as compared with stone-dust or metallic dust”.

Reference is made to the general concurrence of evidence, English, Belgian, and German, that “for some reason or other the mortality of coal miners from phthisical disease is excessively low as compared with that of other workers”.

In relation to this Dr. Hirt (1871) of Breslau is quoted :

“It is in the highest degree probable that coal-dust possesses the property of hindering the development of tuberculosis, and of arresting its progress.”

While admitting that this thesis might ultimately be sustained, Ogle felt that, for various reasons, the conclusion, so far, had not been established beyond all possibility of fair doubt.

The Close of the Nineteenth Century

Meanwhile considerable attention was being focused on occupational diseases of the lungs among other groups of workmen, such as fork and cutlery grinders, earthenware workers, stonemasons, and sandstone quarrymen. This means that doctors were aware of the occurrence of these diseases so that the diminishing prevalence of respiratory disease in coal miners must have been impressive to attract such frequent emphatic record.

Arlidge (1892) in his textbook on “The Diseases of Occupations” comprehensively reviewed the whole subject. His testimony is specially valuable, for he was one of the most distinguished Fellows of the Royal College of Physicians of London, and for many years was consulting physician to the North Staffordshire Infirmary, which served a very extensive coal-mining area. Moreover, lung diseases, because of their serious prevalence among the local pottery workers, were his particular study. He records :

“There is a widespread belief at the present day that the serious lesions of the lungs associated with the calling of coal-getters belong to past history, or, at the most are very uncommon ; and no doubt can exist that, compared with the past, they are becoming rarer, thanks to the introduction of efficient ventilation, of shortened hours of labour, and of the increased attention given to the hygiene of mines.”

The following passage is remarkable for its minute and comprehensive clinical and pathological observations.

“It may be affirmed generally of the dyspnoea of old miners, that it is out of proportion to the extent of disabled lung. Its production is not of uniform origin. One cause is the infarction or ‘stuffing’ of the lung tissue with the foreign matter ; another is the bronchial trouble, with its attendant plugging with mucus and the thickening of the lining membrane of the tubes ; a third is the greater or less extent of tissue in an emphysematous state ; a fourth, active at times, is

blood short of red corpuscles ; a fifth cardiac valvular disease, secondary to the respiratory disturbances ; and a sixth to derangement of nervous supply, consequent, perhaps, on the enlarged and diseased bronchial glands at the root of the lungs and in contiguity with the pulmonary plexus. At all events, paroxysmal coughing and breathing is a usual accompaniment of pulmonary fibrosis.”

Arlidge did not subscribe to the current view of “the conservative influence of coal-dust in warding off tubercular consumption” and he believed that large fibrotic masses could break down without the presence of tuberculosis.

“Further, in fibrosis, there is not the early breaking down of the newly-formed morbid tissues witnessed in tubercular formation. Not but that softening does occur in fibroid degeneration ; still, when it does happen, it begins in the central portion of the mass, and is the result of starvation on account of gradual degeneration and obliteration of blood-vessels. Nevertheless, it may be granted that a softening portion of cirrhused lung may afford a suitable nidus for tubercular matter originating elsewhere ; and that when this happens we may anticipate more serious havoc. This occurrence is well-established by clinical experience.”

So we reach the end of the nineteenth century, and thus far, in tracing the history of the rise and decline of coal-miners’ pneumoconiosis, we have relied mainly on the recorded experience and opinions of practising physicians. The supplement to the sixty-fifth annual report of the Registrar-General published in 1908 provided occupational mortality statistics which serve to test these observations. It is recognized that these figures are not absolute measures but are subject to several errors. In presenting the statistics Tatham (1908) emphasized particularly the fallacies which attach to death certificates for the purposes of dividing phthisis, tuberculosis, and other respiratory diseases and in distinguishing primary disease from terminal complications. Comparison is made of the triennial periods 1890–92 and 1900–02 and the conclusion reached is that “there has been a considerable decline of mortality from disease, not only among miners in the aggregate but also in each section (geographical) of the occupation” (Table 1). Besides, not only did the decline occur in the separate areas but it was reflected in all age groups. Table 2, summarized from the report, indicates the favourable trend of respiratory diseases.

The Opening of the Twentieth Century

Despite the decline the subject continued to attract comment. Dr. Trotter, Medical Officer of Health, Bedlingtonshire U.D.C., Northumberland, writing (1903) on the “so-called anthracosis and phthisis in coal miners” records that “probably largely owing to the great improvements in mine

TABLE 1

COMPARATIVE MORTALITY OF COAL MINERS (OCCUPIED ONLY) AGED 25 TO 65 YEARS IN SELECTED AREAS

	Mortality All Causes	Disease	Accidents
All occupied males { 1890-92	1102	1038	64
.. .. . { 1900-02	925	867	58
All coal miners { 1890-92	1068	905	163
.. .. . { 1900-02	846	723	123
Coal miners in Lancashire { 1890-92	1236	1057	179
.. .. . { 1900-02	1006	875	131
Coal miners in Monmouthshire and South Wales { 1890-92	1322	1041	281
.. .. . { 1900-02	951	782	169
Coal miners in Staffordshire { 1890-92	1100	943	157
.. .. . { 1900-02	846	728	118
Coal miners in West Riding { 1890-92	1051	920	131
.. .. . { 1900-02	783	684	99
Coal miners in Durham and Northumberland { 1890-92	894	783	111
.. .. . { 1900-02	763	658	105
Coal miners in Derbyshire and Nottinghamshire { 1890-92	841	737	104
.. .. . { 1900-02	675	595	80

TABLE 2

COMPARATIVE MORTALITY OF COAL MINERS (OCCUPIED ONLY) AGED 25 TO 65 YEARS FROM RESPIRATORY DISEASES

Ref. No.	Occupation	All Respiratory Diseases	Phthisis	Bronchitis	Pneumonia	Pleurisy	Other Diseases of Respiratory System	
	Occupied males (England and Wales)	{ 1890-92	469	214	101	122	8	24
		{ 1900-02	340	175	53	87	6	19
83	Coal miner	{ 1890-92	423	113	131	141	8	30
		{ 1900-02	274	85	75	85	6	23
83a	Coal miner (Durham and Northumberland)	{ 1890-92	291	109	58	85	10	29
		{ 1900-02	205	84	41	54	6	20
83b	Coal miner (Lancashire)	{ 1890-92	567	118	198	217	14	20
		{ 1900-02	386	96	113	149	14	14
83c	Coal miner (West Riding)	{ 1890-92	473	142	137	165	7	22
		{ 1900-02	247	88	67	71	5	16
83d	Coal miner (Derbyshire and Notts.)	{ 1890-92	263	80	87	77	1	18
		{ 1900-02	186	64	49	52	5	16
83e	Coal miner (Staffs.)	{ 1890-92	463	95	204	127	9	28
		{ 1900-02	277	66	104	71	6	30
83f	Coal miner (Monmouthshire and South Wales)	{ 1890-92	522	124	153	190	5	50
		{ 1900-02	343	93	104	108	5	33

ventilation in this country, these conditions are very uncommon now". He makes this interesting comment :

" This blackening or anthracosis is by no means necessarily due to a diseased condition of the lungs, nor does it seem to be a factor in the causation of a diseased condition of the lungs. Phthisis, either fibrous or tuberculous, as a disease among coal miners due to their occupation is very uncommon indeed ; in fact, as a disease phthisis is probably more uncommon in coal miners than in any other class of workmen in the country."

When tubercular phthisis did occur in any of these cases he was definitely of opinion that it was due to the inhalation of particles from the " post or sandstone strata and the dust from the shale and seggar clay." As all other influences predisposing to tubercular phthisis were present in the area, he believed that coal dust had a protective influence. His conception of anthracosis is interesting :

" Anthracosis as a disease per se does not exist, but is really an epiphenomenon in diseases of the lungs in which this blackening is found."

This contribution was immediately followed by two letters to the editor. Hall (1903) emphasized that Trotter had said nothing new, because Smart, whose contributions have already been noted, had presented all these matters in his clinical lectures at Edinburgh Royal Infirmary in 1892. Purdy (1903), however, who had previously been in practice at Cambois and Ashington in Northumberland, wrote adding his testimony that " the average coal miner often works in the mine under more healthy conditions than those in which he lives at home".

Miners' phthisis was the subject of discussion in the section of pathology at the meeting of the British Medical Association in the summer of 1903. Oliver (1903) of Newcastle-on-Tyne submitted the paper, which is particularly interesting by reason of details of dusting experiments carried out by him on laboratory animals, guinea-pigs and rabbits. The dust was introduced by insufflation, and he was mainly concerned to observe the distribution of the dust and its transport from the alveoli to the lymphatics by large round phagocytes or macrophages. The origin of these cells was obscure ; they are described as " either leucocytes, alveolar epithelial cells, or connective tissue corpuscles ". From references cited it is clear that French pathologists (Claisse and Josué, 1897) had been conducting such experimental studies for several years. Oliver's main conclusions are :

" 1. It is a disease of occupation, due to the irritating action of dust, which renders the individual liable to repeated catarrh, that it is non-tuberculous, not only in the early stages, but may even remain non-tuberculous throughout ; that when tubercle is present it is an accidental infection, which while

hastening the end, does not exercise any very marked influence upon the pre-existing structural alterations caused by dust, unless it be a tendency towards disintegration.

2. That it is a local disease, purely personal to the individual, and never assuming hereditary characters.

3. That accepting this view of the pathology of the disease, miners' phthisis, as experience in this country has shown, may be largely prevented by improved ventilation, and by the adoption of means for the removal of dust or for the allaying of dust by water."

Workmen's Compensation and Occupational Diseases

At this point it is necessary temporarily to interrupt the chronological story and return to the year 1880, which marks the first workmen's compensation act. This was the Employers Liability Act, which provided a measure of compensation to workmen injured by accident arising out of and in the course of their employment. The liability was restricted to accidents, traumatic injury, but meanwhile doctors were directing attention to the increasing toll of sickness and death caused by such occupational diseases as silicosis, poisoning by lead, arsenic, phosphorus, mercury, manganese, and many other substances. The legislature were constantly urged to extend the scope of compensation payments to include occupational diseases, and in 1903 Lord James of Hereford, by an award in Court, established lead poisoning in pottery workers as the first compensatable occupational disease. This precedent, having been achieved, workers were encouraged to press for the inclusion, in like manner, of other diseases.

So in 1906 a Departmental Committee on Compensation for Industrial Diseases was appointed under the chairmanship of Herbert Samuel, Esq., to enquire into what diseases might rightly be regarded as occupational and included in the schedule to the Act. In the course of their investigations considerable expert evidence was submitted on a variety of diseases including fibroid phthisis. Several doctors and laymen from colliery areas gave evidence on the diseases of coal miners and thereby we are enabled to form some idea about the occurrence of respiratory diseases among coal miners throughout the country.

The witnesses were almost unanimous that serious fibroid phthisis had considerably diminished in incidence. Dr. Scott, a physician to Glasgow Royal Infirmary, represents the general opinion ;

" It was very common among miners when I began practice . . . now it is rarely seen, even in hospital."

Black lungs, however, were still encountered in coal miners, and Dr. Bell of Dunfermline expresses the common attitude as to causation ;

" It is undoubtedly at any rate in the first instance due to the inhalation of coal dust and the impregnation of the lung tissue with coal dust ;

and,

"I must say that coal dust is not of itself very injurious either to the lung or to an ordinary wound, it is carbon,

and,

"There is nothing very injurious about the ordinary coal dust except that it irritates to a certain extent and causes bronchitis, but it does not cause injury the same as steel dust, for instance, or copper dust and so on ; there is none of the wasting."

Based on his experience of 3,000 necropsies at the Western Infirmary, Glasgow, Professor Robert Muir testified that black lungs were benign and that he had not met the fibroid phthisis here such as he had seen in his department in Edinburgh, where he had had a wide experience of masons' phthisis. Coal dust, unless mixed with rock dust, was, in his opinion, innocuous.

Having regard to the modern problem of alternative employment for coal miners disabled by respiratory disease, the following passage from the examination of Mr. P. J. O'Keefe, St. Helens, Lancs., is of interest.

"Have you known men who have left the work at 35 and taken up other work? No, they will not do that. You will not get a collier to leave his employment. There are so few branches of employment for them, only labourers' work which is badly paid, so they will not go into that ; and even if they go into chemical works they require to have some training for it."

"Do you think a periodical examination of these workers every six months, with power to suspend men who are beginning to show signs of the disease from the work would be useful? I think it would."

"Except that there is a difficulty about their finding other work? Yes, there is that to contend with."

Among the witnesses there was one dissentient opinion. Dr. A. Rowley Moody of Hanley, North Staffordshire, asserted that "respiratory disease in potters is decreasing but increasing enormously in coal miners". In explanation he adduced the following reasons :

"1. recruits to the mines no longer from country people but from weakly town-dwellers ; 2. the elimination of small mines ; 3. mines becoming deeper and more extensive."

He then proceeded to indicate that "the difficulties in the way of ventilation are, of course, largely increased, and the mines, many of them have got extremely dry and dusty".

In due course the Committee reported :

"We are clearly of opinion that coal miners are not liable to fibroid phthisis, and although cases of anthracosis, using the term to mean cases in which the lung is charged with coal dust, are commonly met with, we cannot find that in any one that condition has proved to be a contributory cause of death."

The Role of Free Silica in Pneumoconiosis

In the following year Oliver (1908) published his classic textbook on diseases of occupation, in which field he was regarded as a leading authority.

He records that in 1878, 30 years before, when he became a physician to the Newcastle Infirmary, miners' phthisis was extremely prevalent, but "so great has been the change which has come over the North of England coal miners that I can safely say there has scarcely been a case of coal miners' phthisis in the wards during the last ten years".

He attributes the disease to previous faulty conditions underground and the improvement to more efficient ventilation. On the occurrence of pulmonary consumption among coal miners, he is among those who support the view that "the occupation rather protects him from, than predisposes him to pulmonary tuberculosis".

In 1914, in a series of five Milroy Lectures delivered before the Royal College of Physicians of London, Shufflebotham, of Stoke-on-Trent, North Staffordshire, devoted himself to a comprehensive review of the hazards of coal-mining in the United Kingdom. For him, however, the real importance of dust in coal mines was in relation to underground explosions. This is significant especially as he did comment on respiratory diseases.

"Though fibroid phthisis does not affect coal miners at the present time in this country, still anthracosis, or infiltration of the lung with coal dust, is widely found". . . .

and again

"Fibroid lung (such as potters suffer from) is rare among coal miners, and anthracosis does not seem to entail disablement. . . . At the present time in Great Britain fibrosis of the lung among miners can be said to be practically non-existent and its disappearance can be wholly attributed to the enforced improvements in the ventilation of mines, in illumination [this probably refers to greater use of safety lamps in place of naked lights], and to shorter working hours."

The next series of Milroy Lectures, delivered by E. L. Collis (1915), was devoted to industrial pneumoconioses. In the literature these have attained to the eminence of a medical classic. Of coal miners he records that "fifty years ago asthma was common among them", and he later adds "the disease, however, common though it used to be, has passed almost unobserved from our midst, and conjectures as to its character and causation are idle." His researches revealed that bronchitis varied in its prevalence in different coalfields, thus it was common among the coal miners in Lancashire and Monmouth and South Wales, while in Northumberland, Durham, and Derbyshire it was practically unknown. This difference he explained by the fact that in the former areas there was considerable faulting and

the lung damage was induced by the rock or sandstone dust :

“ The mortality of Lancashire coal miners condemns dust of the strata between the coal seams. . . .

“ Coal dust then is not injurious, but because it can be easily distinguished, it is useful to demonstrate the path by which dust enters and travels through the lungs.”

His final conclusion, which is, in fact, his main thesis, is important.

“ I have attempted to justify the claim that dust inhalation plays an important part in determining the occurrence of respiratory diseases, some dusts such as coal, it is true, not only appear to have no power of producing pneumoconiosis, but even may possess some inhibitory influence on phthisis ; but most dusts have an injurious influence, and of all dusts that of silica is most injurious.”

Thereby the whole emphasis of noxious dust was placed on free crystalline silica and that particular variety of pneumoconiosis, silicosis. This conclusion almost entirely dominated the subject for the next 15 years, until 1930, by which year asbestosis, a fibroid disease of the lung due to combined silica, had been identified by Cooke (1924) and accepted by experts as of occupational origin.

In 1919 silicosis for the first time was recognized as a compensatable disease, but only under certain

conditions and only in respect of workmen employed in the refractories industries, that is to say in men employed in processes carried on at mines, quarries, factories, and workshops, at which refractory material containing not less than 80% total silica (SiO_2) is got or manipulated with a view to manufacture or sale. This event may be regarded as the beginning of the present phase.

(To be concluded)

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